THERMOS

Baseline Replication Assessment Report – Pilot Cities

20.03.2018

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1 Introduction

The Baseline Replication Assessment Report aims to map-out and assess the national and local framework conditions for a successful adoption of the THERMOS model.

This document constitutes the final issue of the Baseline Replication Assessment Report and focuses on the four Pilot Cities of the THERMOS project: Granollers, Islington, Jelgava and Warsaw, and the 4 Replication Cities: Alba Iulia, Berlin, Cascais and the Greater London Authority.

Throughout this document the most relevant characteristics and features that should be considered for the adoption of the THERMOS tool are analysed. The analysis covers the following elements in each of the four Pilot Cities studied:

- **Heating and Cooling in the local context**: this section contains an analysis of the local energy system (energy mix, key performance indicators on power and thermal supply and demand), the key energy policy and legislation, the adoption of Renewable Energy Sources (RES) in the city and the existing energy objectives and plans, among others;
- **Stakeholder Identification and Engagement**: the main local and national stakeholders that should be engaged for a successful adoption of the tools developed throughout THERMOS are listed in this section, together with the roles that they can hold towards the THERMOS model replication and the strategies to be followed for their engagement;
- **Towards THERMOS Uptake**: in this section the principal barriers that could prevent the adoption of the THERMOS tool and the solutions to overcome them are examined;
- **THERMOS Case Study**: finally, the document focuses the analysis on a single opportunity in a city district or quarter where the THERMOS tool will initially be applied.

This report is therefore meant to establish a baseline and serve both as a guide and a set of practical examples on the information that should be gathered and the stakeholders that should be engaged for a successful replication and adoption of the THERMOS tool.

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2 Jelgava

2.1 Introduction

Jelgava is a city located in the central part of Latvia, around 41 kilometres southwest of Riga, with about 60,000 inhabitants. It is the largest town in the region of *Zemgale*.

The city is 60.32 km^2 in size, with an elevation of 2.5 to 4.5 meters above the sea level.

The climate is warm in summer and spring, relatively mild in autumn and cold in winter. First frosts are observed in the beginning of October; first snowfalls happen in December and snow melts by the end of March.

The ethnic composition in 2015 was the following: 58.9% Latvians, 26.9% Russians, 5.6% Belarusians, 2.5% Ukrainians, 1.9% Poles, 1.4% Lithuanians, 0.8% Romanians, 2% other.

There is a notable industrial, administrative, educational and culture centre in the city.

As Latvia and Jelgava are situated quite far north, the provision of heat has always been of utmost importance and centralised district heating was introduced in 1960's.

Image: Jelgava city

2.2 Heating and Cooling in the Local Context

2.2.1 Local energy system

2.2.1.1 Introduction

Currently Jelgava has a well-developed district heating system that is located in both banks of the river *Lielupe* and interconnected under the river bank, thus creating one common district heating system for the city that is operated and monitored from a biomass combined heat and power (*Rupniecibas* Bio-CHP) plant. The biomass CHP plant can provide up to 85% of Jelgava district heating load from biomass (at the present situation, from local renewable resource – woodchips). From 2013 onwards, Bio-CHP has replaced the heat production based on natural gas HOBs (heat only boiler houses) and has reduced CO_2 emissions in Jelgava of about 35,000 tons/year.

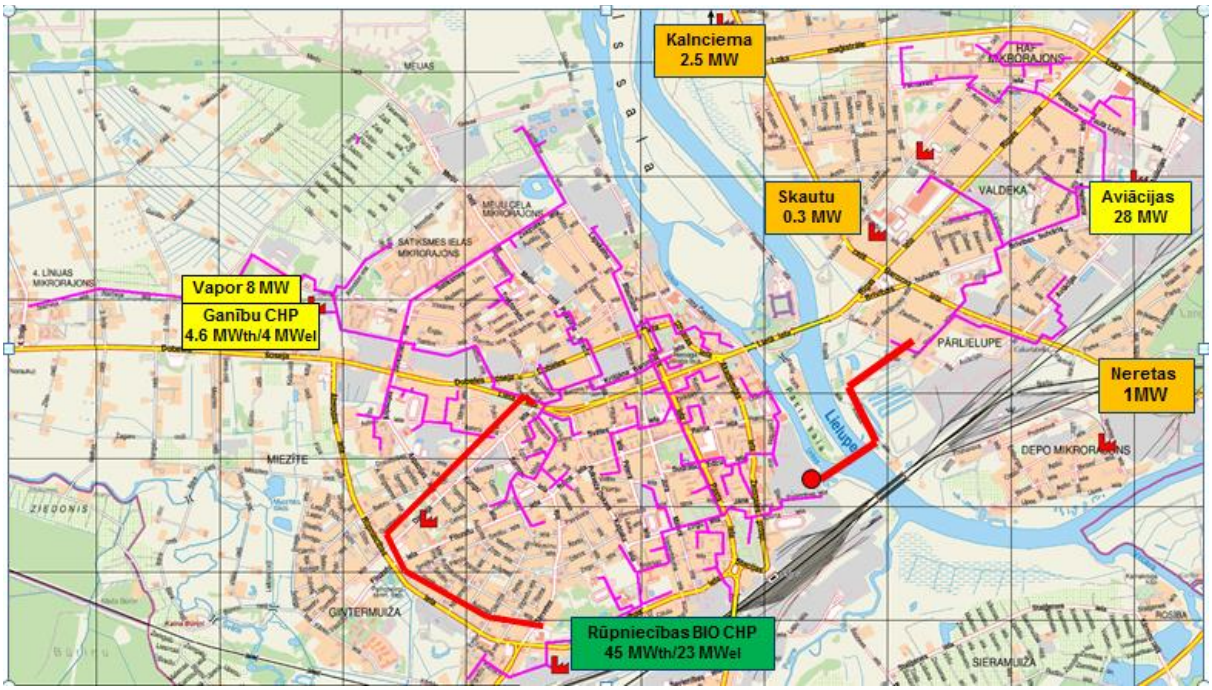
Image: Jelgava city

Jelgava's district heating system is operated by "*Fortum*" since 2008. Currently there are two legal entities: "*Fortum* Jelgava", providing customer service, managing district heating networks and producing heat in natural gas HOBs, and "*Fortum* Latvia", producing heat energy and electricity in CHP mode. Back-up and peak load capacity is provided by natural gas HOBs.

Fortum is a Finnish energy corporation, 51% of the company's shares are owned by the Finnish state.

Fortum in Jelgava (Data of 2017):
•Heat network length - 75km
•Heat sales – up to 200 GWh
•Heat customers – 16,000 households and 400 business customers
•Electricity sales - 150 GWh
•Electricity trade - Nord Pool Spot
•Employees – 78

Figure 1: District heating network and heating sources in Jelgava

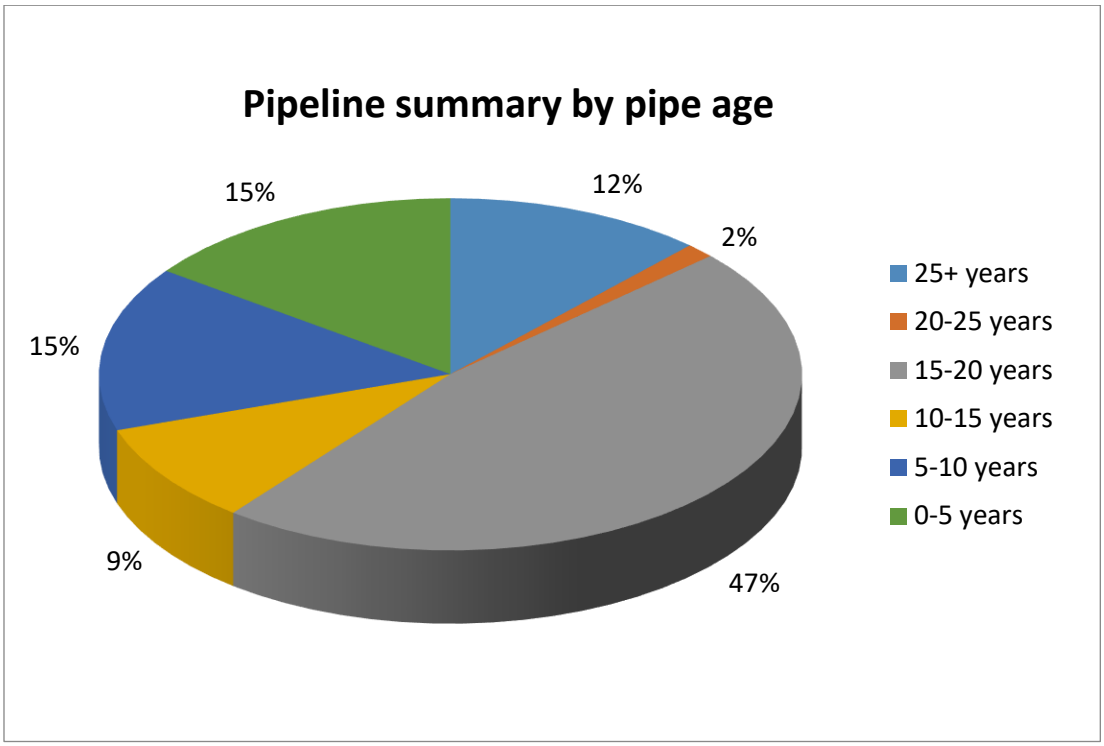


In September 2013, the new biomass CHP plant started its operation in Jelgava. The following are the main technical indicators of the CHP plant:

•District heat capacity – 45 MW_{heat}
•Electricity capacity – 23 MW_e
•Estimated DH produced – 220 GWh (average 2014-2016)
•Electricity – 110 GWh (average 2014-2016)
•Boiler type – bubbling fluidized bed boiler – technology that allows to utilize lower quality wood chips

•Type of wood chips - wood residues and clearings of agricultural lands

Jelgava's district heating system has been rehabilitated and upgraded providing the corporate clients and Jelgava residents with reasonably priced heat energy. The heating tariffs are on average price level when compared to other cities in Latvia.
Heat losses of the DH network are about 16%. Every year part of network is renovated.



Energy consumption

The total electricity consumption in Jelgava in 2013 was around 145 GWh. In the same year, the total heating consumption reached around 230 GWh.

The following charts show the distribution of the electricity and heat production and consumption in Jelgava by energy source and by sector:

Figure 2: Production of local heat in Jelgava by energy source (2013)

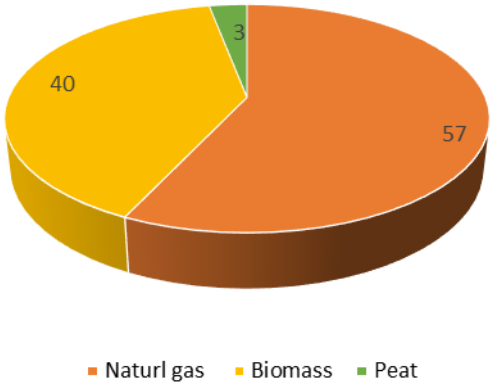


Figure 3: Production of electricity in Jelgava by energy source (2013)

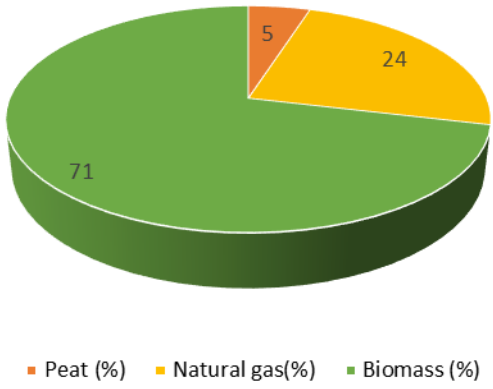


Figure 4: Heat consumption (in %) in Jelgava by sector (2013)

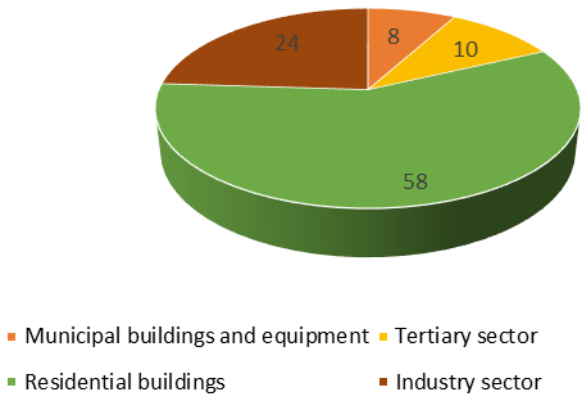


Figure 5: Electricity consumption (in %) in Jelgava by sector (2013)

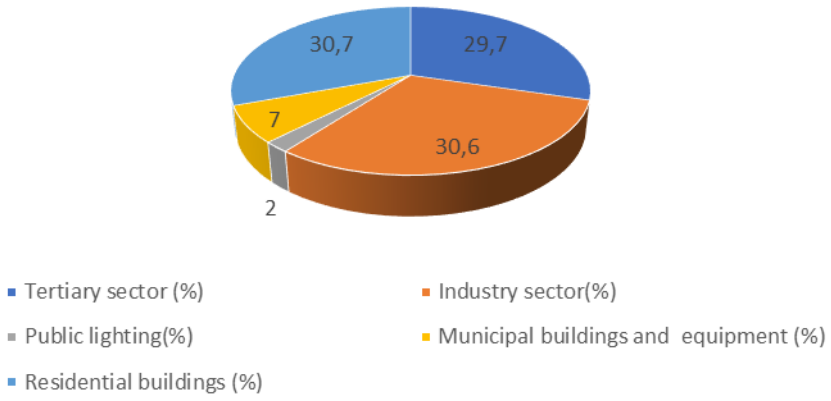


Figure 6: Final energy consumption by sector in Jelgava (2013)

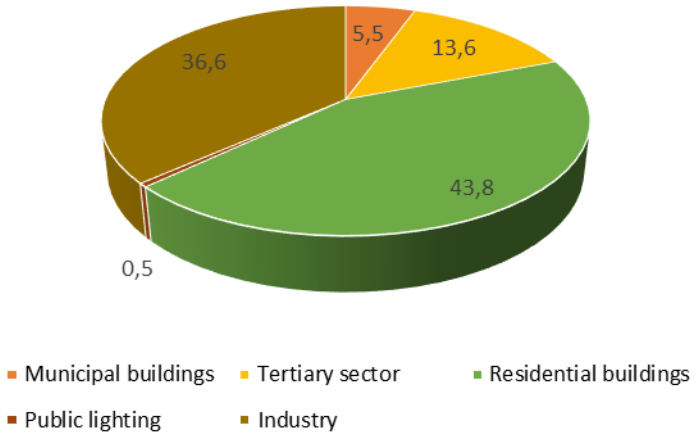
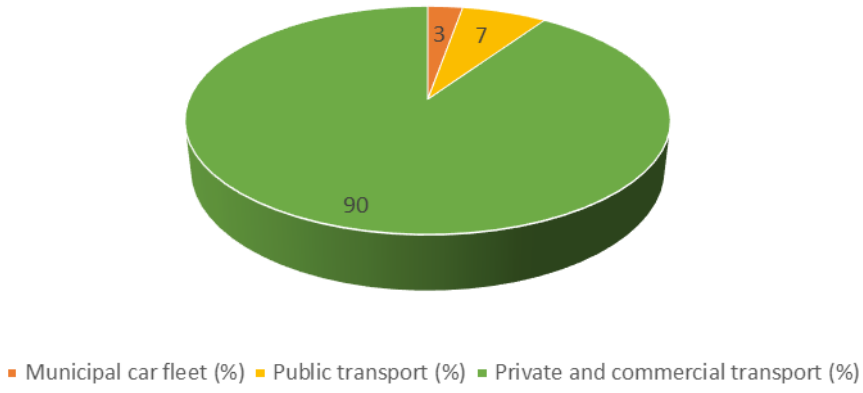


Figure 7: Fuel consumption in the transport sector in Jelgava (2013)



2.2.1.2 Thermal energy supply and demand

The main heat source in Jelgava is Bio-CHP, peak loads are covered by natural gas boilers. The preeminent fuel at the moment is woodchips, which, due to the chosen Bio-CHP technology, can be accepted even at a very low quality and therefore represents a cost-efficient alternative.

There is full back-up capacity for Bio-CHP that is delivered with natural gas HOB. Most of the boilers are in good condition. The main thermal energy users are households in multi-apartment houses. Given the quite far northern position and the cold climate linked to it, the average heat consumption of multi-residential buildings is about 150 – 200kWh/m^2. The renovation process to improve energy efficiency has been ongoing since 2009, with support of national programmes, where part is co-financed by EU funds. In Jelgava 21 multi-residential building have been renovated so far and 4 more are in pipeline to be renovated in the comings years. After the refurbishment, energy savings of 50-60% are usually achieved.

Key performance indicator	**DH network**	**Jelgava city (estimation)**
Number and type of energy generation units	Bio-CHP (1), Gas-CHP (1), natural gas HOB (5)	
Solar thermal energy generation (MWh/ year)	0	Very rare, in some private households
Heat pump energy generation (MWh/ year)	0	In some private households
Biomass energy generation (MWh/ year)	150	~190
Buildings' energy consumption in the residential sector (MWh/ year)	130	~140
Buildings' energy consumption in the commercial sector (MWh/ year)	35	~55
Buildings' energy consumption in the industrial sector (MWh/ year)	10	~30

There are very few producers that have waste heat and potential volumes are small and cannot be connected to the network. Bio-CHP in base load at summer time has waste heat and therefore it is critical to increase capacity volumes and use a special base for summer time. Household waste is not commonly used as an energy source in Latvia and the potential in Jelgava has not been investigated.

2.2.2 Key Heating and Cooling policy and legislation

Main normative acts that directly or partly influence the thermal energy system in the city and at national level are:

- Energy Law: sets main principles for power, natural gas and heat energy markets

- Regulations No. 876 "Regulations on Supply and Use of Thermal Energy"
- Law "On Regulators of Utilities" methodology from regulator: establishes the rules for setting tariff, registration criteria, monitoring
- Apartment Law
- Residential Buildings Maintenance Law
- Law "On Rent of Residential Premises"
- Consumer Protection Law
- Personal Data Protection Law
- Competition Law
- Energy Efficiency Law
- Energy Efficiency Law of Buildings

Regarding technical issues:

- Sanitary Protection Zone Law
- Construction Law
- General Construction Regulations
- Regulations of Certain Engineering Buildings
- Law on Procurement by Utilities Companies

2.2.3 Heating and Cooling within urban development and renovation programmes

2.2.3.1 Heating and Cooling Objectives

Since 2009 Jelgava is one of the signatory cities of the Covenant of Mayors. Subsequently the 'Sustainable Energy Action Plan of Jelgava City for the years 2010-2020' was elaborated. The target of the SEAP is to reduce CO_2 emissions at least per 20%, to increase energy efficiency per 20% and to produce 20% of the total energy consumption from renewable energy resources up to 2020 (20/20/20).

The main direction to reach the targets set in the SEAP is to improve the energy efficiency of end users by decreasing their overall energy consumption. In addition, expanding the centralized district heating network would significantly help the city reach the targets: an expanded district heating network would optimize the efficiency of the district heating system, would decrease CO_2 emissions and fossil fuels consumption and would be more cost-effective.

A decrease in the energy consumption due to energy efficiency activities in buildings can however lead to an increase in the cost of energy. Therefore, one of the main priorities for Jelgava is to deliver heat in a stable and safe way being, at the same time, cost-effective and environmentally friendly. The development of the district heating network should follow those premises.

Overall, the city district heating network is in good condition, but there are investments planned to decrease heat losses which are responsibility of Fortum Jelgava.

Regarding the introduction of a centralised cooling system, the situation is being monitored (e.g. for new shopping centres, office buildings or educational institutions). Monitoring activities will help estimate the potential district cooling solution in the city that could be economically feasible and that would lead to significantly lower CO_2 emissions compared to traditional solutions.

2.2.3.2 Energy Efficiency Opportunities

In line with Jelgava's SEAP, the main potentials and measures for energy efficiency are:

1) Improvement of energy efficiency in multi-residential buildings;
2) Improvement of energy efficiency in educational establishment buildings and other municipal buildings;
3) Modernisation of the municipal lighting system;
4) Use of RES for provision of heat and hot water;
5) Provision of energy efficient municipal public transport;

For Fortum, as DH provider, the opportunities comprise:

- Increase in the size of the district heating network by connecting new customers
- Increase in the use of RES to produce heat to DH network.

2.2.3.3 Renewable Energy Adoption and Potential

In September 2013, Jelgava *Fortum* opened the new CHP station fuelled by wood biomass producing electricity and heat. Since then, renewable energy has been used to provide 80% of Jelgava inhabitants and businesses (the customers connected to the district heating network) with green energy.

Customers which are not connected to the district heating network mainly use fuels such as natural gas and wood or pellets. Ground source pumps, coal, electricity heating, diesel are however much less common.

For individual consumers outside the existing DH system, the THERMOS software could help assess potential solutions, such as connecting to the district heating network, electricity network, pellet boilers, solar collectors, ground source pumps or any other technology. THERMOS software could help estimate alternatives considering also CO_2 emissions as a key factor.

2.2.3.4 Transport and infrastructure

The provider of public transport in Jelgava is SIA Jelgava bus park (*'Jelgavas autobusu parks'*). To provide public bus services it operates 35 busses which run with diesel, to which 5% of

biodiesel is added as required by Latvia legislation. Buses are new and comfortable. Jelgava Bus Park is considering the purchase of several electric buses for their fleet in 2017-2018.

The municipality administration, the educational establishments, municipal police and other municipal service providers run their own car fleets, mostly fuelled by petrol and diesel. In 2014 three electrical vehicles were bought for the municipal police, and 1 for the municipal company '*JPPI Pilsetsaimnieciba*', which takes care of the streets, parks and public lighting of the city.

In line with the EU Directive 2014/94/ES of October 2014, on the introduction of the alternative fuel charging stations, it has been decided at national level that by the end of 2020 there will be 60 charging stations for electric vehicles installed on national roads, providing that the distance between such stations is not bigger than 30 km. By 2022, 175 charging stations will be installed on regional roads as long as the distance between them is not greater than 50km.

2.2.4 Financing Opportunities and Instruments

In Jelgava, heating and cooling is provided by the limited company SIA "*Fortum* Jelgava". *Fortum* usually invests their own funds to specific projects of renovation of district heating networks, or construction of a cogeneration station, etc.

The other financial options include:

- Municipal loan from the Latvia State Treasury – this is a usual way in most of the projects for improvement of municipal infrastructure, as the interest rate is usually lower than the one offered by commercial banks.
- Loan from the banks.
- Use of an ESCO company – the ESCO market in Latvia is very new and in the initial phases. For a small country as Latvia, with less than 2 million inhabitants, there are about 7 ESCO companies in the market in 2017. As there is insufficient experience with ESCO type contracts, it is considered that they have heavier terms and conditions and longer periods of time than conventional construction contracts. Therefore, municipalities are reluctant to be the first to try them.
- Now and then some National support programmes (usually using part of financing from EU funds) are announced. In 2017, the Latvian Ministry of Economics has announced a support programme for the reconstruction of heating energy production units to increase energy efficiency and transfer to renewable energy sources; support the improvement of energy efficiency of heat distribution and supply systems, etc.

2.3 Stakeholder Identification and Engagement

2.3.1 Local stakeholders

2.3.1.1 Fortum Jelgava

Fortum Jelgava is the district heating producer and supplier, responsible for maintenance and *development* of DH network and heat supply.

2.3.1.2 Jelgava City Council, Construction department.

The construction department coordinates the construction projects in Jelgava city: issues construction permits, approves the documentation, approves technical designs, issues technical requirements for streets and roads, provides spatial planning of the city etc.

2.3.1.3 Zemgale Regional Energy Agency (ZREA)

ZREA is an energy agency established by Jelgava city council. ZREA is a non-profit body under Latvian Law on Associations (Societies) and Foundations. Members of *Zemgale* Regional Energy Agency represent 4 municipalities, a heating company Fortum, 2 NGO-s, and a house maintenance company (municipal limited company).

The key activity of ZREA is to support improvement of energy efficiency, use of renewable energy resources and green transport in communities of *Zemgale* Region. This includes energy planning, energy data management, advice and consultations to individual residents/ consumers, energy projects and energy events.

In 2010 ZREA prepared Sustainable Energy Action Plan (SEAP) for Jelgava City, the signatory of the Covenant of Mayors. ZREA acts as coordinator, promoter of implementation of the plan, and supporter to the strategic workgroup. ZREA is the authorised representative for Jelgava city in Covenant of Mayors initiative.

2.3.1.4 The Operative Information Centre of the Municipality (POIC)

POIC is the municipality institution responsible for fast exchange of information regarding city infrastructure, for development and safety of city infrastructure.

2.3.2 Regional stakeholders

2.3.2.1 Ozolnieku KSDU

Ozolnieku KSDU is the district heating provider in neighbouring *Ozolnieku* County municipality. KSDUE could possibly use THERMOS tool for planning their district heating networks.

2.3.2.2 SIA 'Auces komunalie pakalpojumi'

'*Auces komunalie pakalpojumi*' is the district heating provider in nearby municipality - *Auce* county. There are three separate district heating systems operated by Ltd. '*Auces komunalie*

pakalpojumi'. They could possibly use THERMOS tool for planning their district heating networks.

2.3.2.3 Ltd 'Jekabpils siltums'

Ltd '*Jekabpils siltums*' the district heating provider in the *Jekabpils* city municipality. It is a municipal limited company that could take advantage of the THERMOS tool for planning their district heating networks.

2.3.3 National stakeholders

2.3.3.1 Latvian Association of Heat Enterprises

Professional membership organisations that is an active developer and lobby for the heating and cooling industry. Its members are almost all district heating companies, producers or equipment and industry experts. Members from this association would cover a significant part of the users of the THERMOS tool.
Link: www.lsua.lv

2.3.3.2 Ministry of Economics (Department of Renewable Energy and Energy Efficiency)

The Ministry of Economics is the leading state administrative institution in the field of economic policy formation in Latvia. The Ministry plans and manages the provision of measures related to the prevention of energy crises. Another function of the Ministry is to introduce and supervise the programs and projects of EU structural funds and other foreign financial means. The Ministry has developed the Energy Development Guidelines 2016-2020, proposing policy guiding principles, objectives and lines of action in the energy sector over the next five years to the Latvian government.
Link: https://www.em.gov.lv/en/

2.3.3.3 ALTUM

ALTUM's shareholders consist of the Republic of Latvia's Ministry of Finance, the Ministry of Economics and the Ministry of Agriculture. The organisation provides financial aid for measures improving energy efficiency in multi apartment residential buildings, provided to apartment owners of multi apartment buildings. The objective of the programme is to promote energy efficiency improvement, smart energy management and the use of renewable energy resources at apartment buildings. The target audience and beneficiaries are multi-apartment building's apartment owners.
Link: https://www.altum.lv/en/

2.3.3.4 Ministry of Environmental Protection and Regional Development (Climate Change Department)

The Ministry of Environmental Protection and Regional Development of the Republic of Latvia is the responsible for implementing policy in three areas - environment protection, regional development and information and communication technologies. In the area of regional

development, the Ministry implements and evaluates regional policy at state level, provides methodological guidelines and supervises the territorial development planning process, as well as ensures the development and supervision of local governments with the overall goal of achieving a well-balanced and sustainable development of the country. The Ministry is responsible for the climate change mitigation policies and measures to limit and reduce greenhouse gas emissions as reducing carbon dioxide emissions is gaining importance in Latvia in line with the common policy and concerns about climate change in the world and the European Union.
Link: http://www.varam.gov.lv/eng/par_ministriju

2.3.3.5 Latvian Environmental Investment Fund

The Ministry of Environmental Protection and Regional Development of Latvia owns 100% of the Latvian Environmental Investment Fund's shares. The Mission of the Fund is to reduce environmental pollution, promoting the implementation of environmental protection projects, and to increase the capacity of municipalities and commercial organizations in preparing and carrying out qualitative and effective projects from their idea to realization. Our activities are directed to achieving the maximum improvement of environment, investing financial resources in the implementation of environmental infrastructure development projects. From 2010 to 2020 the Fund is providing supervision of the implementation and post-implementation monitoring of projects co-financed by the Climate change financial instrument (Green investment scheme - co-financing approximately 200 EUR million). Since 2015 the Fund manages another financial instrument: Emission allowances auctioning instrument (EKII). The instrument gives support for:

- Improving the energy efficiency of buildings in the public and private sectors;
- Technologies using renewable energy sources (RES) development and implementation
- Implementing integrated solutions to reduce GHG emissions.

Link: http://lvif.gov.lv/?object_id=460

2.3.3.6 The Latvian Association of Local and Regional Governments

The Association is a public organisation compiling local governments of the Republic of Latvia on a voluntary basis. It functions as a representative, advocate and advisor of the local governments in Latvia and Europe and contributes to the development of municipal policies, solve common problems and defend the interests of local governments.
Link: http://www.lps.lv/en

2.3.3.7 Latvian Bioenergy Association

Members are mainly owners of Bio-CHP
Link: www.balteneko.lv

2.3.3.8 Riga Technical University (Faculty of power and electrical engineering) (Course Heatsupply)

The Faculty of Power and Electrical Engineering educates and trains engineering specialists in the fields of power engineering, electrical engineering and environmental science, who are competent in electrical power transmission and distribution systems and their control, electric machines and apparatuses, power electronics and electric drives, industrial automation and computerized control, issues of energy efficiency, as well as environment protection and management.

Link: http://www.eef.rtu.lv/kontakti_fakultate.php

2.3.3.9 Institute of energy systems and environment

The Institute of energy systems and environment deals with energy and climate change policy-making and implementation. In addition, it carries out scientific research in the energy sector.

Link: http://videszinatne.rtu.lv/eng/

2.3.3.10 Latvia University of Agriculture (Applied energy program)

The students of this university acquire knowledge of heat, cold and electricity production, transmission and use of alternative energy and energy economy, power plants and process management. There are opportunities to specialize in energy supply or energy economy.

Link: http://www.llu.lv/en

2.3.3.11 Institute of Physical Energetics

The Institute of Physical Energetics is the leading institute in Latvia in the field of energy research. Its main activities cover a wide scope of energy research issues, such as the modelling and analysis of energy interactions and environmental policy studies, the pricing and tariff policy in the energy sector, the energy efficiency improvement and energy conservation programmes. The integration of the technologies directed towards the rational use of energy to ensure a sustainable development of the Latvian energy sector and the optimisation of the heat energy production and consumption systems in Latvia is given special attention in the research work of the institute.

Link: http://fei-web.lv/en/

2.3.3.12 Riga Energy Agency

One of the main functions of the Riga Energy Agency is to elaborate and update the Development Concept of Riga District Heating System and to cooperate with governmental and municipal institutions, non-governmental organizations and other legal actors as well as physical entities, etc.

Link: http://www.rea.riga.lv/en/

2.3.3.13 Latvian Association of Heat, Gas and Water Engineers

Currently, the association unites 355 engineers which work as engineers or lecturers at universities. The association has elaborated the strategy for the development of the engineering sector and implements it via its members. The association elaborates and corrects the national standards of the relevant areas, sets the criteria for study programmes and provides advice on projects and research studies. The association also provides certification of the physical persons for the works such as the elaboration of technical designs, assembly, issues professional certificates at heat, ventilation, and air conditioning, gas supply, water supply and sewage, as well as in energy audit areas.

Link: http://www.lsgutis.lv/par-mums

2.3.4 Existing stakeholder participation processes

The identified national stakeholders will be involved in liaison group meetings.

The Latvian partners in the THERMOS project will participate in work group meetings which are relevant to the project scope. For example, The Latvian Association of Local and Regional Governments holds monthly meetings for the representatives of the municipalities to introduce and discuss the progresses on the field. This meeting can be used to inform about the THERMOS model. The same applies to the workgroup meetings of the Latvian Association of Heat Enterprises.

2.3.5 THERMOS Local Liaison Group

Jelgava City Council, Construction department
Fortum Jelgava
Zemgale Regional Energy Agency (ZREA)
The Operative Information Centre of the Municipality (POIC)
Ozolnieku KSDU
SIA '*Auces komunalie pakalpojumi*'
Ltd 'Jekabpils siltums'
Latvian Association of Heat Enterprises
Ministry of Economics (Department of Renewable Energy and Energy Efficiency)
The Latvian Association of Local and Regional Governments
Riga Technical University (Faculty of power and electrical engineering) (Course Heat supply)
Institute of energy systems and environment
Institute of Physical Energetics
Riga Energy Agency
Latvian Association of Heat, Gas and Water Engineers

2.3.5.1 Stakeholder roles towards THERMOS model replication

Considering the working field and expertise of the local and national stakeholders identified, they can help in the development process of the THERMOS tool, expressing their visions and/or evaluating the model during its elaborating process.

Local stakeholders will overtake the model and adapt it to the municipality's district heating needs.

National stakeholders (policy makers) will evaluate the tool and give recommendations for its replication in other municipalities.

National stakeholders (educational institutions) could use the tool in the study process. Finally, national stakeholders (associations) could use the tool to evaluate and model cross field cooperation projects for the development of district heating systems.

2.3.6 Stakeholder Engagement Strategies

It is important to engage local and national stakeholders at least in three stages: the initial meetings, in order to raise awareness of the THERMOS tool; at midterm, informing on the progress; and at final stage, demonstrating the ready-made tool and training them in its use.

Thus, the identified local and national stakeholders will be involved in liaison group meetings. In addition, the Latvian partners involved in the project will participate in work group meetings with associations and other relevant stakeholders to the project scope, such as the previously mentioned monthly meetings held by the Latvian Association of Local and Regional Governments or the Association of the District Heating Providers.

2.4 Towards THERMOS Uptake

2.4.1 Barriers

In order to enlarge the existing district heating network, it is key for Jelgava city to develop sustainable heating systems, to fulfil the targets of the Covenant of Mayors and to decrease the costs of heat for end users. The main barrier to stimulate the development of the existing district heating network is that end users already have some heating solutions and often the low purchase power does not allow them to connect to the district heating network or choose alternative solutions that would lead to decreased CO_2 emissions, reduction of fossil fuels consumption and would improve the overall system efficiency. The lack of detailed planning and calculation tools makes the process of network expansion slow as for each potential model of possible network layouts, the investment payback calculation takes a long time. Existing system planning is simple but time consuming, based on human skills (work), without possibilities to make different models and more sophisticated calculations.

2.4.2 Proposed solutions

The municipality can support the reduction of CO_2 emissions and energy efficiency in thermal systems with very limited tools and motivators. The main activities regarding the development (extension) of thermal systems in Jelgava can be done by the heat producer and supplier - *Fortum*. The THERMOS tool could provide faster calculations of modulation of possible network layouts and would decrease timeframes and improve the quality of the decision-making process to focus on areas that would benefit all involved parties.

2.4.3 THERMOS exploitation opportunities

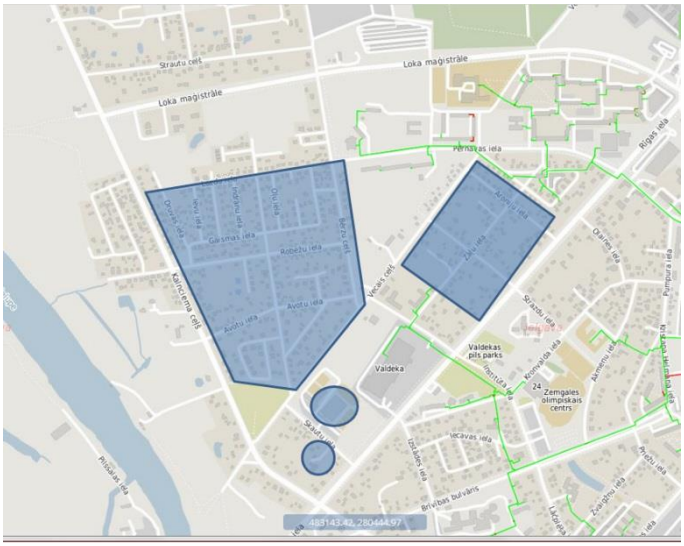
Latvia takes the third place in Europe in terms of percent of population being supplied with the district heating service, after Iceland and Lithuania. Namely, there is a district heating system in all the biggest municipalities (the municipalities are responsible for this service). For instance, in 2013 district heating for sales was produced in 638 boiler houses and in 166 cogeneration stations, which all together produced 7,29 TWh of heat for around 2 million inhabitants and corporative clients in Latvia. There are some DH system planning tools in the market, but they are either expensive or not accessible. The THERMOS tool will be the first open source tool in the area, and as such can be used by many municipal and other district heating providers in the *Zemgale* region and in the rest of Latvia. Therefore, it will be promoted both among the municipalities and heating providers of the *Zemgale* region and in the whole country via the associations.

2.5 THERMOS Case Study

2.5.1 Objectives

There are several areas in Jelgava which are not currently connected to the existing DH network, but that are near to it. Some end users have expressed their willingness to switch to district heating, but their individual connection to the network does not make sense for none of the financing parties. There are no time resources and technical possibilities to make models with possible layouts of the network and minimal capacities and connection points to further develop projects. The THERMOS tool could focus on specific districts of the city and could provide planners with possible alternatives and options of network layouts so that they can decide to connect or disconnect potential end users based on the needed investment, the potential heat consumption, heat losses, payback time and other relevant parameters. This would enable a decision-making process based on qualitative information. In the map below, the marked areas could be potentially interesting for the network expansion and to increase the overall network efficiency, as many of the end users there use fossil fuels at the moment.

Figure 8: Targeted areas for the expansion of the network



2.5.2 Key stakeholders

2.5.2.1 Fortum Jelgava

Fortum Jelgava is the district heating producer and supplier, responsible for the maintenance and development of the DH network and the supply of heat. The company determines the areas where the network will be developed and allocate the necessary funding to implement the planned investment projects. The main challenge is to balance the required investments with end users' consumption, and to make the chosen development areas effective from all perspectives – heat losses, reduction of CO_2 emissions, costs/income balance etc.

2.5.2.2 Jelgava City Council, Construction department

The Construction department coordinates the construction projects in Jelgava and issues all the construction permits and the documentation that has to be arranged. The network has to fully fit spatial planning of the city.

2.5.2.3 End users

End users influence the process the most – it depends on their decisions whether the project will be feasible. End users need help to evaluate the economic and ecological potential, as well as other benefits linked to the change of the energy solution from the existing one to the district heating.

2.5.3 KPI indicators table

Key performance indicator	
Number and type of energy generation units	For each building, own wood or natural gas boiler

Solar thermal energy generation (MWh/ year)	0
Heat pump energy generation (MWh/ year)	0
Biomass energy generation (MWh/ year)	Estimate – 2,580
Buildings' energy consumption in the residential sector (MWh/ year)	Estimate – 4,080
Buildings' energy consumption in the commercial sector (MWh/ year)	1,050
Buildings' energy consumption in the industrial sector (MWh/ year)	0

2.5.4 Financing status/ opportunities

The investment in the district heating network would be made fully by Fortum Jelgava or by sharing costs for connection pipes with customers. There are very limited or even no possibilities to get extra financing from other funds.

2.5.5 Exploitation of the opportunity

2.5.5.1 Barriers

The main barriers are to estimate the minimal amount required from end-users, to start a pro-active process of expansion of the district heating network and to allocate the necessary funding for it. There is lack of tools and time to make the calculations and potential models of different possible scenarios. It therefore leads to slow decision-making processes regarding the network expansion.

2.5.5.2 Proposed solutions

THERMOS could solve the lack of information through the calculation of complex scenarios with different network layout options and with many versions of potential end users connected to the network. In this case study, where there are many small individual end-users, the possibility to model different scenarios is critical to support the next steps of development of the district heating network.